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This invention relates to methods and compositions for materials having a non-leaching coating that has antimicrobial properties. The coating is applied to substrates such as gauze-type wound dressings. Covalent, non-leaching, non-hydrolyzable bonds are formed between the substrate and the polymer molecules that form the coating. A high concentration of anti-microbial groups on multi-length polymer chains and relatively long average chain lengths, contribute to an absorbent or superabsorbent surface with a high level antimicrobial effect.